

Warming Earth Thaws Diseases Dormant within Frozen Permafrost

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https://2.bp.blogspot.com/-ReuXdBasENI/WBp2GN_fDLI/AAAAAAAAADk4/fhQ2sWqRkHwm2o9OUmCyb8-z0IA591t2ACLCB/s1600/Blackdeath2.gifSpread of the Black Death in Europe (1346-1353). Population collapses this rapid are not unknown (source[1]; click to enlarge). by Gaius PubliusMost people in this country think of "global warming" as a mainly linear event, an uphill ride at roughly the same pace to a cliff's edge far enough in the future to be not a present concern. Most people also don't have much of a picture of what the problems will be when we get nearer that cliff's edge. They do see sea level rise, of course, but a slow one, and a slow loss of farm land — or in the U.S. case, farm land that leaves this country and moves north, as it were, into Canada.Many people imagine there will be wars over resources — though on other "less civilized" continents — but nothing that really threatens us.

It's likely true that Americans don't yet picture social and political chaos that "comes home" in the form of violent retribution, nor do they imagine social dislocations on our soil that end in bloodshed. And they certainly don't imagine the ravages of plague and epidemic — of diseases that can start anywhere in the world and travel as far and as fast as humans can carry them — of diseases so old and dormant that humans have no natural immunity to them, or medicines to treat them with.Scientific American has news for us[2] (my emphasis): As Earth Warms, the Diseases That May Lie within Permafrost Become a Bigger WorryScientists are witnessing the theoretical turning into reality: infectious microbes emerging from a deep freezeThis past summer anthrax killed a 12-year-old boy in a remote part of Siberia. At least 20 other people, also from the Yamal Peninsula, were diagnosed with the potentially deadly disease after approximately 100 suspected cases were hospitalized. Additionally, more than 2,300 reindeer in the area died from the infection. The likely cause? Thawing permafrost. According to Russian officials, thawed permafrost—a permanently frozen layer of soil—released previously immobile spores of *Bacillus anthracis* into nearby water and soil and then into the food supply. The outbreak was the region's first in 75 years.Anthrax is serious stuff, but the outbreak was not unexpected: Researchers have predicted for years that one of the effects of global warming could be that whatever is frozen in permafrost—such as ancient bacteria—might be released as temperatures climb. This could include infectious agents humans might not be prepared for, or have immunity to, the scientists said. Now they are witnessing the theoretical turning into reality: infectious microorganisms emerging from a deep freeze.Although anthrax occurs naturally in all soil and outbreaks unrelated to permafrost can occur, extensive permafrost thaw could increase the number of people exposed to anthrax bacteria. In a 2011 paper published in *Global Health Action*, co-authors Boris A. Revich and Marina A. Podolnaya wrote of their predictions: 'As a consequence of permafrost melting, the vectors of deadly infections of the 18th and 19th centuries may come back, especially near the cemeteries where the victims of these infections were buried.'And permafrost is indeed thawing—at higher latitudes and to greater depths than ever before. In various parts of Siberia the active layer above permafrost can thaw to a depth of 50 centimeters every summer. This summer, however, there was a heat wave in the region, and temperatures hovered around 35 degrees Celsius—25 degrees warmer than usual. The difference possibly expanded or deepened the thaw and mobilized microorganisms usually stuck in rigid earth. Although scientists have yet to calculate the final depth, they postulate that it is a number that has not been seen in almost a century. Permafrost thaw overall could become widespread with temperatures only slightly higher than

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those at present, according to a 2013 study in *Science*. Heat waves in higher latitudes are becoming more frequent as well. Again, this not an anthrax epidemic, at least not yet, and anthrax can be contained. It's about what else may come up as the permafrost thaws. Some bacteria can't survive extreme cold, but some do just fine; witness the anthrax bacterium, for example. Another concern is viruses: Viruses could also survive for lengthy periods. In 2014 and 2015 Claverie and his colleague Chantal Abergel published their findings on two still infectious viruses from a chunk of 30,000-year-old Siberian permafrost. Although Pithovirus sibericum and Mollivirus sibericum can infect only amoebas, the discovery is an indication that viruses that infect humans—such as smallpox and the Spanish flu—could potentially be preserved in permafrost. It's not just present-day viruses that present the worst problem. Prehistoric viruses certainly infected prehistoric humans in this region: Human viruses from even further back could also make a showing. For instance, the microorganisms living on and within the early humans who populated the Arctic could still be frozen in the soil. 'There are hints that Neandertals and Denisovans could have settled in northern Siberia [and] were plagued by various viral diseases, some of which we know, like smallpox, and some others that might have disappeared,' Claverie says. 'The fact that there might be an infection continuity between us and ancient hominins is fascinating—and might be worrying.' Not all of this is troubling, yet. But it could be very troubling, since diseases have been known[3] to decimate whole populations in as little as a decade: The Black Death or Black Plague was one of the most devastating pandemics[4] in human history[5], resulting in the deaths of an estimated 75 to 200 million people and peaking in Europe[6] in the years 1346-1353.[1][7][2][8][3][9] Although there were several competing theories as to the etiology[10] of the Black Death, analysis of DNA from victims in northern and southern Europe published in 2010 and 2011 indicates that the pathogen[11] responsible was the *Yersinia pestis*[12] bacterium, probably causing several forms of plague[13].[4][14][5][15] The Black Death is thought to have originated in the arid plains of Central Asia[16], where it then travelled along the Silk Road[17], reaching Crimea[18] by 1343.[6][19] From there, it was most likely carried by Oriental rat fleas[20] living on the black rats[21] that were regular passengers on merchant ships[22]. Spreading throughout the Mediterranean[23] and Europe, the Black Death is estimated to have killed 30-60% of Europe's total population.[7][24] In total, the plague reduced the world population[25] from an estimated 450 million down to 350-375 million in the 14th century. The world population as a whole did not recover to pre-plague levels until the 17th century.[8][26] The plague recurred occasionally in Europe until the 19th century. The plague created a series of religious, social, and economic upheavals, which had profound effects on the course of European history[27]. Again, about 30-60% of the population of Europe died of the plague, and that doesn't count those who died in Asia, where the disease likely began. Today, of course, we have modern medicine. Still, earth's present human population is roughly 7.5 billion people[28]. Can you imagine the consequences of the sudden illness of even 5% of that number, and how much medicine it would take to treat them, assuming we had already developed it? Or worse, can you imagine the chaos cause by the death of even 1% of that number — the death, in other words, of 75 million people — in just a few years from one set of factors? To start, there would be martial law in every country on earth, with every border closed. Is Climate Change an Emergency Yet? This is not to frighten but to warn. These events aren't likely ... perhaps ... but they are possible. Is climate change, global warming, an emergency yet? Collapses sometimes happen slowly, it's true, but they also sometimes happen quickly and suddenly. In the "climate science" world there are two key concepts — mitigation and adaptation. Mitigation is what you do ahead of time to lessen the blow. Adaptation is what you do to absorb the blow after it hits. If we want to mitigate the consequences, we have to start now, and start in earnest, not at a rate that keeps big money flowing into the hands of people like Charles Koch and the CEO of Exxon (and into the hands of their paid politicians in both parties). We can't keep these men and women — the Kochs and their bought politicians — happy and comfortable and still survive. At the start of this piece, I wrote this: Most people in this country think of "global warming" as a mainly linear event, an uphill ride at roughly the same pace to a cliff's edge far enough in the future to be not a present concern. I hope you now see this as a failure of imagination, one that could lead to an even profounder failure. Should we be preparing just to adapt to the consequences of global warming, or working now to lessen the warming itself? If you think the latter is preferable to the former — that it's better to soften the blow than adapt to it — you might also think that emergency mobilization[29] is needed, starting now. After all, we mobilized against the Germany and Japan in World War II, and that turned out pretty well. It also proved that we could mobilize, and effectively. We can unite in action like that again, but only if enough people come to think it's necessary. You can join the growing group of people (like Bernie Sanders[30]) who do think it's necessary. You can also talk about addressing global warming in this way to your circle of friends, to "spread the word" as it were. That way, when what I've been calling the "national freak out moment" does arrive, spurring a national will to act, enough people will be ready to act in the only way that will work

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— aggressively and immediately.GP [1]: https://en.wikipedia.org/wiki/Black_Death [2]:
https://www.scientificamerican.com/article/as-earth-warms-the-diseases-that-may-lie-within-permafrost-become-a-bigger-worry/?wt.mc=SA_Reddit-Share [3]: https://en.wikipedia.org/wiki/Black_Death [4]:
<https://en.wikipedia.org/wiki/Pandemic> [5]: https://en.wikipedia.org/wiki/History_of_the_world [6]:
<https://en.wikipedia.org/wiki/Europe> [7]: https://en.wikipedia.org/wiki/Black_Death#cite_note-ABC.2FReuters-1 [8]:
https://en.wikipedia.org/wiki/Black_Death#cite_note-Health._Decoding_the_Black_Death-2 [9]: https://en.wikipedia.org/wiki/Black_Death#cite_note-Black_Death.27s_Gene_Code_Cracked-3 [10]:
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<https://en.wikipedia.org/wiki/Crimea> [19]: https://en.wikipedia.org/wiki/Black_Death#cite_note-6 [20]:
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<http://www.pledgetomobilize.org/gp> [30]: <http://theweek.com/speedreads/618655/bernie-sanders-frames-climate-change-urgent-existential-war>

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